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Implications for Rural Communities

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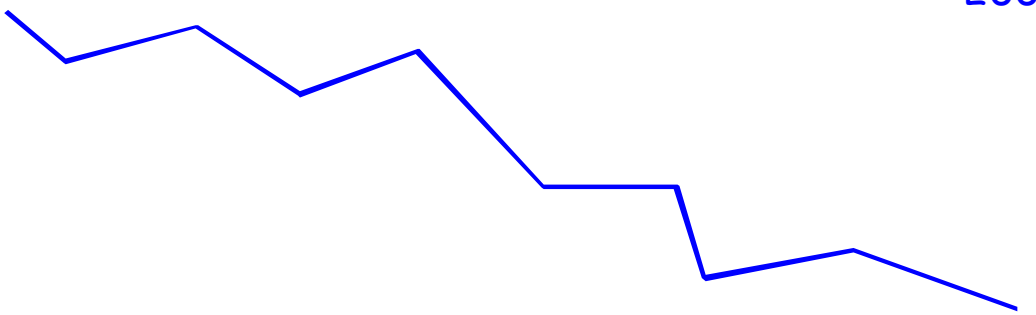

U.S. Economic Development Administration

Internet-Based Commerce: Implications for Rural Communities

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ABSTRACT

Many have expressed concern about the "digital divide" that exists between various socioeconomic groups and places. Among those places currently lagging in the diffusion and use of advanced information technologies are rural communities. This paper presents a review of available literature and considers the prospects and implications of the rural digital divide. Rural economic characteristics, telecommunications infrastructure, and leadership capacity are evaluated in light of the emerging information-intensive economic realities. Challenges for the rural public sector also are considered, given the growth of electronic commerce and what it may mean to rural public finance. Finally, adaptive strategies are outlined to help close the information technology gap that exists for many rural communities.

Those who are concerned about rural economic viability must consider a broader framework of what it means to be competitive in an economy increasingly dependent on advanced information technologies. We need to move beyond emphasis on electronic commerce and Internet tax policy to a fuller range of concerns including strengthening human and institutional capacities and improving access and infrastructure. To remain economically viable, rural communities will require both access and the capacity to utilize technology for a broad range of applications related to learning, institution building, community organization, and services delivery as well as economic uses.

Key Words: rural development, digital divide, electronic commerce

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INTRODUCTION

In just the past decade, we've witnessed a true phenomenon with the growth of the World Wide Web. Advances in the Internet and other telecommunications technologies have opened new frontiers in communications, commerce, medicine, politics, and almost every other aspect of private and public life. It is not an overstatement to suggest that the Internet is among the most powerful forces shaping the early 21st Century.

We see many stunning applications of Internet-Based technologies daily. The Internet promises a revolution in the delivery of health care services, in opportunities for civic involvement, and in the structure of economic relationships. Most people embrace these seemingly improved prospects for communication and service delivery. But as we rush headlong into this new reality, it is prudent to note what is happening to the people and places affected by this revolution.

In recent years, concerns have been expressed about the "digital divide" that has emerged between groups of people who have the access and ability to take advantage of these technologies and those who do not. The divide spans ethnic, socioeconomic, and geographic boundaries (National Telecommunications and Information Administration (NTIA) 1999). It becomes appropriate to ask who may be lagging behind as we move forward into a technology-intensive economic future.

This paper is intended to make a contribution to this discussion by summarizing some of what is currently known about Internet-Based commerce and its potential effect on rural communities in the United States. In only the past year, a substantial literature has emerged on this and related topics, most of which was accessible through the Internet itself. The federal government, academic institutions, nonprofit organizations, and industry groups have been active in debating a host of issues related to Internet access and the broader implications of advanced information technologies.

It remains too early to draw conclusions regarding whether Internet-Based commerce will ultimately be a net asset to all rural areas. Indeed, the available literature spans the gamut of perspectives. Academic literature remains sparse on many important topics, probably due to both the recency of the phenomenon and the agonizingly slow pace of peer review. Some of the material from the federal government, especially the executive branch, is tinged with a sense of boosterism and an optimism that all problems will be overcome in time. Interest groups consider similar issues and see starkly different realities.

What quickly becomes apparent, however, is that the narrow topic of Internet-Based commerce is only part of a much larger phenomenon affecting rural community viability. The broader perspective of how rural communities will fare in an economic environment increasingly dominated by advanced information technology is the real issue that needs consideration. How information technologies, including Internet-Based commerce, will create or constrain opportunities for rural people is where we must focus attention.

As with most major trends affecting rural prospects, some places will benefit and others will continue to lag. Much will depend on the local capacity to understand these new challenges and implement adaptive strategies. Critical intervening variables include the rate of infrastructure diffusion and the response by institutions concerned with the welfare of rural people and places.

At this early stage, we can identify some of the issues and relationships involved. The paper proceeds in the second section by defining the scope of the information technology phenomenon that is unfolding. The third section considers rural community competitiveness across multiple dimensions of economic and social activity. Local public finance concerns are the focus of the fourth section. The fifth section takes a brief look at some of the challenges and solutions in dealing with Native American communities in rural areas. Finally, we identify a number of adaptive strategies available to rural communities.

OVERVIEW OF THE INTERNET ECONOMY

In this section, some basic facts about the Internet-Based economy are discussed. Here and throughout the paper, a broad interpretation of "electronic commerce" is adopted. Indeed, the notion of electronic retailing is only one of many types of new *information technologies* (IT) that may affect the economic viability of rural places. It quickly becomes apparent that any discussion about the Internet and rural places must consider multiple facets of a larger picture. Thus, several issues thought to affect rural prospects are considered.

Scale and Scope of the Internet Economy

The dimensions of the Internet-Based economy extend far beyond the notion of Web-based retail sales. Perhaps the most widely cited conception was offered by Cisco Systems and the Center for Research in Electronic Commerce (CREC) located at the University of Texas at Austin (1999). Researchers there conceptualize the Internet economy as consisting of four layers of economic activity.[1]

The first layer is the *Internet infrastructure* layer. This layer consists of the telecommunications companies, manufacturers of networking equipment and PCs, Internet service providers, and other vendors who help make the physical system work. This includes firms such as the telephone companies, Compaq Computers, and Cisco Systems. The CREC estimated this industry group accounted for more than $40 billion in annual revenue and 656,600 jobs in the year ending in the first quarter, 1999. These figures are up 50 percent and 39 percent, respectively, from the year before.

The second layer of the Internet economy is *Internet applications* layer. This involves the software makers and other intermediaries that facilitate Internet-Based transactions. These include firms such as Microsoft, Oracle, and Netscape. CREC estimated this layer increased revenue 61 percent to $22.5 billion and employment by 38 percent to 563,100 jobs, between the first quarters of 1998 and 1999.

The *Internet intermediary* layer is the third layer of the Internet economy. It contains the firms that help provide the content found on the World Wide Web. These firms develop products for using the Web, such as search engines, or those who broker Web-based transactions, such as online travel agents and brokerages. Recent growth in these sectors has been equally impressive: revenue up 52 percent to $16.6 billion in the 12 months ending in the first quarter of 1999, and employment up 25 percent to 444,300 in the same period.

The final layer of the Internet economy is one that engages directly in the sales of products and services over the Internet, the group the CREC labels the *Internet commerce* layer. Such firms include the Internet-Based book sellers, auto dealers, and subscription services. In the year ending with the first quarter of 1999, this group accounted for $37.5 billion in revenue and 900,900 jobs, up 127 percent and 78 percent, respectively.

Needless to say, there has been phenomenal growth in these sectors of the economy. While information technology-producing sectors comprise only a small percentage of overall economic activity in the United States, they account for a substantial proportion of the positive economic news of late. The U.S. Department of Commerce (Buckley et al. 2000) credits these combined sectors with contributing on average 30 percent of the nation's real economic growth between 1995 and 1999, reducing overall inflation by an average 0.5 percentage points annually between 1995 and 1998, and contributing about half of the overall productivity growth observed in the U.S. in the latter half of the 1990s.[2] Further, the Commerce Department projects that by 2006, almost half of the U.S. workforce will be employed in industries that are either major producers or intensive users of information technology products and services.

How Electronic Commerce Benefits Business

In addition to growth associated with the industries building the Internet infrastructure and the content of the World Wide Web, the new technology enables two types of economic relationships that are beneficial to many companies. The first is hardly visible to ordinary consumers, while the second targets those very consumers.

The greatest economic value currently associated with Internet-Based commerce involves *business-to-business* transactions (Organization for Economic Cooperation and Development (OECD) 1998).[3] Shifting many of the internal functions of business operations, such as order placement, inventory control, technical specification procurement, and product distribution, from paper-based to electronic transactions can dramatically reduce business costs and increase productivity. Many of the largest companies have reported significant savings and are increasingly demanding that suppliers and vendors switch to electronic systems (Table 1).[4] With the Internet, these electronic linkages are moving from expensive, proprietary systems that utilize leased telephone lines to less expensive and more accessible connections utilizing secure servers and encryption software. To some degree, this will force small and mid-sized vendors doing business with larger companies to acquire technologies sooner than they otherwise might.

Table 1. E-commerce Impact on Various Distribution Costs (US$ per transaction).

	Airline Tickets	Banking	Bill Payment	Ins. Policy	Software Dist.
Traditional System	8.0	1.08	2.22 - 3.32	400 - 700	15.00
Telephone-based		0.54			5.00
Internet-Based	1.0	0.13	0.65 - 1.10	200 - 350	0.20 - 0.50
Savings (%)	87	89	67 to 71	50	97 to 99

Source: OECD 1998. *The Economic and Social Impact of Electronic Commerce: Preliminary Findings and Research Agenda*, page 14.

The U.S. Department of Commerce (Buckley et al. 2000) outlines numerous ways information technology has transformed business practices:

- New marketplaces have opened on line in nearly all industries as new intermediaries facilitate exchanges, increase information access at very low cost, and generally expand the scope of business-to-business relationships.
- Traditional business-to-business intermediaries seem to be adapting to the Internet-Based market by finding new ways to add value to exchanges in areas of logistical, financial, and information services.
- The Internet-Based market has broadened business-to-business market participation by lowering the costs of access to nonproprietary global protocols that permit the efficiencies achievable through automating business processes.
- The Internet has opened new auction spaces for the sale of used and surplus goods, and has provided wider dissemination of requests for bids.
- Businesses are also using network technologies to improve access to information for such things as product design, inventory control, training, and a host of other human resource and management functions.
- Finally, the Internet also provides a new channel for the distribution of digital goods such as books, music, movies, and news.

The second way the Internet has been utilized by business is *direct sales* to the final consumer (business-to-consumer).[5] Businesses such as Amazon, e-Toys and Auto-by-Tel appeared seemingly out of nowhere only a few years ago and now rack up staggering sales figures (OECD 1998). Somewhat belatedly, more traditional merchants such as Walmart and Borders Books are also aggressively moving online. The Internet has allowed many merchants to open hitherto inaccessible markets at relatively low cost.

The Department of Commerce report (Buckley et al. 2000) also identifies the advantages of business-to-consumer commerce in an online environment:

- Consumers have access to vastly expanded information resources with which to research and comparison-shop prior to making purchases, even if those purchases are from traditional retailers.
- Online auctions open a new marketplace, facilitating customer-to-customer transactions.
- Among the major early leaders in online consumer applications are health care, employment services, research and information dissemination services, and product and service information providers of all types.
- Although more slowly than the private sector, local, state, and the federal governments are moving online to facilitate information access and conduct other public business.
- Various types of online "communities of interest" are forming, many created by commercial companies to make finding those of similar interests easier.

All of this discussion points to the scope and scale of what is occurring, and begs the question of whether rural places will participate in the benefits associated with this economic growth. The positive view suggests the technology can help rural communities overcome the disadvantages of distance and remoteness. Critics counter that the capacity to access and use the technologies will be slow in coming to rural places.

ECONOMIC ACTIVITY AND RURAL COMMUNITY COMPETITIVENESS

There are several ways to address the question of rural competitiveness in this new business environment. Unfortunately, much of the assessment is largely speculative given the paucity of research data. Some of the available information is gleaned from Internet-business boosters or advocacy groups, and needs to be evaluated accordingly. Thus, the best that might be accomplished is to raise questions about how rural areas are likely to fare, perhaps offering a preliminary framework for thinking about electronic commerce in the context of rural development.

In this section, a number of related issues relevant to the question of competitiveness are discussed: (a) the general characteristics of rural places and the extent to which they are conducive to fostering economic growth in a technically-driven economy, including rural industry structure and characteristics of the labor market; (b) the extent to which the telecommunications infrastructure for accessing Internet-Based services exists in rural areas; (c) rural access to critical services that either demand advanced telecommunications or could be significantly strengthened through such access; and (d) the capacity of rural leadership and institutional structures that may affect the adaptation to a new economic reality.

Rural Characteristics

Rural America is a large and diverse area. Some rural places, particularly those with high amenity values and those not too distant from metropolitan communities, are doing quite well (McGranahan 1999; Vias 1999; Johnson and Beale 1999). Other rural places suffer from what is sometimes called the "rural penalty" (Malecki 1996). Actually, there seem to be three general characteristics of rural places that would affect their access to or use of IT. First, the remote geography both increases costs associated with infrastructure diffusion and makes rural markets less attractive for outside investment. Second, the economic structure of rural places seems a detriment insofar as their industries are neither heavily IT-producing or IT-using. Finally, the human capital found in rural areas does not seem especially attractive either as a labor market or a consumer market. Issues associated with economic structure and human capital will be discussed in this section, while the geographic/infrastructure issues are discussed in a later section.

Rural Industry Structure

Those industries that are either involved in the development of Internet-related technologies or are heavy users of the information that may flow through this medium are the most likely beneficiaries of Internet-Based commerce. Studies produced by the U.S. Department of Commerce (Buckley, et al. 2000; Henry, et al. 1999) defined critical components of the emerging "digital economy." Researchers identified the industry sectors that are the major producers of IT, including those related to the Internet (Table 2), and the industry sectors considered the major users of IT equipment (Table 3). They documented the relatively more rapid growth of IT-producing industries, as well as the increasing efficiency of IT-using industries relative to other sectors of the economy.

Table 2. Information Technology Producing Companies

Hardware Industries	**Software/Services Industries**
Computers and equipment	Computer programming services
Wholesale trade of computers and equipment	Prepackaged software
Retail trade of computers and equipment	Wholesale trade of software
Calculating and office machines, nec[a]	Retail trade of software
Magnetic and optical recording media	Computer integrated systems design
Electron tubes	Computer processing, data preparation
Printed circuit boards	Information retrieval services
Semiconductors	Computer services management
Passive electronic components	Computer rental and leasing
Industrial instruments for measurement	Computer maintenance and repair
Instruments for measuring electricity	Computer related services, nec[a]
Laboratory analytical instruments	
Communications Equipment Industries	**Communications Services Industries**
Household audio and video equipment	Telephone and telegraph communications
Telephone and telegraph equipment	Radio and TV broadcasting
Radio and TV and communications equipment	Cable and other pay TV services

[a] not elsewhere classified

Source: Buckley et al., U.S. Department of Commerce 2000. *Digital Economy 2000*, page 23.

While no studies providing definitive data were found, in reviewing the industry lists it might be speculated that urban areas are likely to possess a higher absolute number and proportionate share of these types of industries than rural areas. Rural economies tend to be dominated by traditional extractive industries, lower-skill manufacturers, local government institutions, and a relatively large proportion of retail and service proprietors (Malecki 1996; Besser 1998; Cook and Mizer 1994; ERS 1995). Many of these economic sectors are not projected to experience particularly strong growth (Hamrick 1998). Traditional rural assets that tended to lower production costs may not be an advantage for IT-related industries (Office of Technology Assessment (OTA) 1991).[6] Such a characterization would not bode well for prospects that rural areas might commonly host high-tech IT industries.[7]

Table 3. Industries Considered Major Users of Information Technology Equipment

Telecommunications	Security and commodity brokers
Radio and TV broadcasting	Business services
Other services, nec[a]	Health services
Motion pictures	Holding and investment offices
Legal services	Wholesale trade
Insurance carriers	Real estate
Instruments and related products	Insurance agents and brokers
Depository institutions	Nondepository institutions
Pipelines, except natural gas	Petroleum and coal products
Chemicals and allied products	Electronic equipment

[a] not elsewhere classified

Source: Henry et al., U.S. Department of Commerce 1999. *The Emerging Digital Economy II*, page 28.

Whether rural areas can be competitive in attracting IT-producing or -using sectors is debatable. There is need for more research dealing with the location of IT activity. The research might begin with a simple sorting of urban versus rural places based on the presence of these industry sectors. The location requirements of these industries and the extent agglomeration economies characterize any one or combination of these industries can also be investigated. Resulting patterns may indicate something about future economic growth prospects, or even where there might be emerging clusters of activity that could be fostered (Kim, Barkley, and Henry 2000; Gibbs and Bernat 1997).

Certainly, rural industries will also utilize IT. The agricultural sector, for example, has a great potential to benefit from electronic commerce. Estimates suggest the value of electronic commerce in the agriculture sector could reach $70 billion by 2003 with additional growth to follow (Staihr 2000). Everyone associated with agriculture, from the smallest family farm to international agribusiness corporations, will have opportunities to participate in online auctions, purchase inputs, and reach new markets. Whether this will be a net benefit to rural places, however, remains to be seen. Much of the farm economy is comprised of supply and distribution networks that may now become obsolete. How these changes in agriculture will affect the broader rural economy is currently unknown.

Rural Labor Markets

The Department of Commerce report also considered the effects of these trends on labor markets. IT-related occupations were identified (Table 4). IT jobs tend to be highly skilled, and require frequent updating of those skills. Correspondingly, the wages for IT workers tend to be higher than the economy-wide average. The Department of Commerce report cautioned that the wage gap between IT workers and other workers is likely to widen (see also Meares and Sargent 1999; Katz 1999; D'Amico 1999).

Table 4. Information Technology Occupations

Engineering, science & computer system managers	Electrical and electronics engineers
Database administrators	Computer engineers
Systems analysts	Computer support specialists
Computer programmers	All other computer scientists
Broadcast technicians	Electrical and electronics technicians
Computer equipment operators	Duplicating, mail and other office machine operators
Data processing equipment repairers	Billing, posting and calculating machine operators
Communications equipment operators	Data entry keyers
Electrical powerline installers and repairers	Electronics repairers, commercial and industrial equip.
Telephone and cable TV installers and repairers	Electrical and electronic equipment assemblers, precision
Central office and PBX installers and repairers	Electromechanical equipment assemblers, precision
	Electronic semiconductor processors

Source: Buckley et al., U.S. Department of Commerce 2000. *Digital Economy 2000*, page 43.

Here, again, to the extent urban places have a relatively greater quantity of people possessing needed occupational skills, potential employers will find urban locations more attractive locations (Gale et al. 1999). It might also be instructive to look at the occupational characteristics and differences between rural and urban areas. Similarly, the presence of educational and other worker training institutions may be another predictor of IT industry growth, with differences between urban and rural places.

In a related fashion, electronic commerce promises to change many existing occupations. A report by the OECD (1998) suggests the sectors most likely affected by adoption of new technologies include communications, entertainment, education, health, professional services, publishing, financial services, and the postal service. Within these sectors are travel agents, investment brokers, insurance agents, and many

other occupations that facilitate transactions or broker information. While it is still too early to project the effects that electronic commerce may have on these and other occupational categories, it is probably safe to assume that the nature of many of these jobs is likely to change. The OECD report concludes that while electronic commerce may not cause the wholesale elimination of many of these jobs, exactly what these people do within the occupation is likely to be affected. This, of course, places a premium on individual adaptive skills.

This is relevant to the discussion of rural areas to the extent many of these occupations represent the small businesses of rural communities. In rural areas, a high proportion of all jobs are retail and service sole proprietors. To the extent large non-local firms market directly to consumers, there may be an erosion of the income earned by local providers and increasing leakage of income from rural areas. Similarly, the challenge to many of these providers is to adapt to the changing way business is done. This will likely present a challenge to many service providers in rural and urban areas alike, with the major difference being that urban places should have greater access to new skill training and to alternative occupations, if these people need to change careers.

In addition to the challenges associated with geography and economic structure are the demographic characteristics of rural places. Rural places tend to have populations with lower levels of income and educational attainment and higher proportions of the elderly and disabled (Rogers 1999; Enders and Seekins 1999; Bowers and Hamrick 1997). All of these factors are known to influence computer access and use (Goslee 1998; NTIA 1999).

The challenge for many of the small businesses in rural areas will be to embrace the opportunities that information technologies offer, particularly in gaining access to distant markets. A good example might be in real estate where a rural broker has the opportunity to market recreational land to prospective buyers in distant urban places. For the broker, this will require not only the additional outlay associated with building and maintaining the Internet presence but also a reexamination of marketing strategies and practice.

Rural Telecommunications Infrastructure

Not surprisingly, rural areas are lagging behind more populous urban areas in the development of telecommunications infrastructure capable of the high-speed transmission of large quantities of data. The problem is one of *bandwidth capacity*, or the amount of data that can flow through the lines connecting us to the Internet. In an assessment of the rural information infrastructure, the NTIA and the Rural Utilities Service concluded rural areas were lagging behind urban places in the availability of telecommunications technologies (2000; see also U.S. Department of Commerce 1995 and OTA 1991).[8] The report indicated that problems of distance and low population densities hindered the diffusion of these technologies, and noted that rural areas may benefit relatively more with access to such services as telemedicine, electronic commerce, and distance education. While technology exists to close the gap between urban and rural

areas, service providers are moving most quickly to build the urban telecommunications infrastructure. For the most remote rural users, there are no existing technologies that can deliver all of the telecommunications services that may be desirable (OTA 1991).

At least part of the problem, according to an advocacy group, are current regulatory barriers that prohibit the Regional Bell Operating Companies from offering a fuller range of communications services across geographic boundaries (Robison 1999). A coalition of industry and public interest groups, iAdvance, argues that current regulations have placed many rural areas at a relative disadvantage in the development of new *backbone hubs*, the gateways to the Internet. The coalition identifed the "disconnected dozen" states at highest risk for falling behind in the development of this critical Internet infrastructure (Table 5). It projects a dramatic increase in the creation of new backbone hubs in virtually all states given regulatory change (Olbeter and Robison 1999). Without such change, the gap in the diffusion of these technologies is likely to grow.

iAdvance argues that geographic access is critical to the cost structure of Internet service providers (ISPs), which facilitate Internet access for businesses and consumers. However, Greenstein (1999a) found no clear evidence of any relationship between the location of ISPs and access to Internet technologies for business and personal use. While there are clear urban-rural differences in the range of services offered by ISPs, Greenstein (1999b) suggests it is the characteristics of the firms present in rural areas that is more important in explaining these differences and that location factors are only weakly related to the types of services ISPs offer.

Some have argued that access to broadband capacity will actually increase the digital divide. The Benton Foundation (Le Blanc 2000) points out that simply stringing high-capacity cables is not enough. Accessing the capacity inherent in those cables will also require upgrading in-house and in-business wiring, which many families and firms cannot afford.

It is beyond this paper's scope to fully evaluate the technical and economic issues associated with Internet-Based services delivery as well as the merits of regulatory change.[9] It is an issue, however, that would seem to affect rural viability.[10] Many rural areas could experience a relatively greater benefit from the type of information advanced telecommunications makes possible. This might particularly apply in the cases of telemedicine, distance education, and video conferencing. Over the past century, school districts have experienced a steady consolidation and decline in absolute numbers as the economics of education made many small and remote schools unsustainable. Similarly, rural hospitals and other health care services are currently experiencing a transition as the economics of health care are forcing the closure of many rural hospitals and/or their transition to critical care or elder care facilities. Maintenance of quality educational systems, medical services, and the capacity for businesses to communicate with home offices, clients, and suppliers have direct implication for rural economic viability.

Table 5. The "Disconnected Dozen" States with Proportionately Fewer Telecommunications Backbone Hubs Based on Population.

State	Actual Number of Hubs	Expected Number of Hubs if Deregulated
Alabama	6	40
Arkansas	2	28
Idaho	2	30
Iowa	3	33
Maine	0	29
Montana	0	26
New Hampshire	3	42
North Dakota	0	24
Oklahoma	7	33
South Dakota	0	30
West Virginia	0	24
Wyoming	1	30

Source: Olbeter and Robison 1999. *Breaking the Backbone: The Impact of Regulation on Internet Infrastructure Deployment*, page 3.

Rural Leadership and Institutional Capacity

One of the more inscrutable but essential qualities of rural places that affects community economic viability is the quality of their leaders and institutions. These institutions include the schools, service groups, local governments, and the many other organizations that have a major influence on local quality of life. Clearly, visionary and effective leaders can have a significant impact on a community. What a single individual can accomplish, however, is small compared to the potential of organized groups banding together to achieve community goals. Thus, the quality of local institutions and their interactions are critical to creating an environment conducive to taking action that can improve community viability (Flora and Flora 1993).

To energize local leaders and institutions, rural communities must foster a broad-based understanding of the opportunities that information technologies provide. If rural communities need upgraded telecommunications infrastructure or local training programs, the demand must come from a cross section of community organizations. Among the local institutions that are well-positioned to lead the effort are schools and libraries, given the numerous government and foundation initiatives to provide Internet access. Similarly, many local social service providers are aware of the potential that communication technologies offer for

information access and organizational development. Beyond these groups, however, local business organizations, local governments, and civic and service groups must grasp the potential for individual, business and organizational benefit from information technologies. When there is broad-based understanding of community need and consensus among local institutions emerges, there is greater likelihood that the community will take successful action. This will be true in relation to community technology needs just as it is for local economic development, health care, or any community problem.

There may be some question about the capacity of rural institutions to facilitate community consensus building and foster adaptive strategies to bring about needed change. Socioeconomic and demographic indicators suggest that the people who make up rural institutions may lack the interest, understanding, and experience needed to make technology access and use a major community priority. Among the major predictors of Internet use among individuals are wealth, education, and age (Benton Foundation 1999; NTIA 1999). Rural areas tend to be less wealthy, less educated, and older than urban places, all factors associated with lower use of the Internet.

Also relevant in this discussion is the extent to which information technologies can strengthen local institutions. Indeed, there is early evidence that the Internet can be used as a tool to strengthen social institutions and other local communities of interest. Kavanaugh (1999) found that the Internet, especially e-mail and discussion lists, reinforces and even expands social networks in a community. Further, and this is important relative to the quality of interaction between groups, Internet users who are members of multiple local organizations use the technology to strengthen ties between organizations. These ties between groups make it easier for the community to mobilize quickly and organize to achieve common goals.

Thus, the social/organizational function of the Internet can be used as a tool for rural community organization and goal attainment. Particularly in rural communities, where so much depends on voluntary efforts by community groups, this capacity would strengthen local institutions. The question and challenge is whether rural community leaders, for whom much of the new advanced telecommunication technology is alien, can learn to harness its potential.

CHALLENGES FOR THE RURAL PUBLIC SECTOR

The public sector in rural areas faces a number of challenges associated with electronic commerce. Many of these challenges stem from institutional trends quite apart from advances in telecommunications technologies, specifically, to trends associated with the devolution of public service responsibilities. The decentralization of responsibility from broader levels of government has created a situation where local well-being is increasingly left to the private market and local communities. Communities are largely on their own to formulate strategies to respond to the broader forces that may create or constrain opportunities. In many rural areas, the local public sector, by default, is a key local institution with the legitimacy and resources needed to provide leadership in crafting local responses.

In this environment, it becomes essential that local public officials and other community leaders understand the importance of these emerging economic trends. In particular, there are at least three areas where community leaders need to formulate adaptive strategies: (a) responding to threats to the local tax base; (b) advocating for the creation of telecommunications infrastructure needed to maintain critical community services or to serve as direct provider of telecommunications services; and (c) utilizing the technology to strengthen local government.

Concerns Related to Local Public Finance

Among the chief concerns of local officials is public finance. Probably nowhere is the aversion to local property taxes greater than in rural areas where large numbers of fixed-income elderly and land-rich/income-poor farmers reside. Despite local efforts to minimize using property as the source of public-sector revenue, rural areas do not have many alternatives. In many states, legislatures have restricted local access to alternative revenue sources in their zeal to provide tax relief. Thus, there exists an overdependence on property taxes as the primary source of revenue.[11] In rural areas where local governments may have access to the retail sales tax, the tax base is often weak at best. Lower rural per capita income, coupled with the propensity for people to travel to regional trade centers, make the sales tax base extremely vulnerable. Thus, there is concern about the well-being of one of the few alternative local sources of public sector revenue.

Many state and local governments have expressed concern over the 1998 federal moratorium on new taxes related to Internet commerce (Mazerov and Lav 1998). The “Internet Tax Freedom Act” has been justified as providing protection for the yet-embryonic cyberspace-based economic engine federal and some state policy makers are eager to encourage (see, for example, the Web site of U.S. House Representative Christopher Cox at http://cox.house.gov/nettax/welcome.htm). Similarly, much has been made about the supposed indirect benefits associated with the creation of many new high-paying jobs and revenue-generating economic activities (Cline and Neubig 1999). Along the same line, it has been said the Internet will strengthen industries to the extent productivity enhancements make them more competitive, thereby protecting and potentially expanding states’ and localities’ tax bases (OECD 1998). Finally, the moratorium provides time to devise a system that avoids unfair double- and triple-taxation of Internet-Based transactions (Hellerstein 1999).

Advocates for states and local governments, however, see the moratorium as eroding an important revenue source (Mazerov and Lav 1998; Bonnett 1998; see also the National Association of Counties Web site for numerous news releases at www.naco.org). A wide range of estimates have been generated regarding the revenues at stake, ranging from inconsequential catastrophic losses.[12] The variation is due both to the limited empirical data currently available and the alternative assumptions incorporated into the analyses. Bruce and Fox (2000) estimated annual state sales tax losses of about $1.2 billion in 1999 and reaching $10.8 billion by 2003. Most of the losses were due to business-to-business transactions rather than business-to-consumer transactions.[13] Recently, the U.S. General Accounting Office (GAO) estimated state and local sales tax losses due to Internet sales ranging between $300 million and $3.8 billion in 2000, or less than two percent of general sales tax revenue under any scenario considered (GAO 2000). By 2003, GAO estimated tax losses between $1 billion and $12.4 billion, or from about one percent to five percent of projected sales tax revenues.

For local governments in rural areas, the concern is twofold. The fear is that the Internet-Based commerce will join catalogue sales as another means whereby retail sales "leak" from the local economy. Fewer local sales means less retail sales tax. Equally troubling is the effect that additional competition will have on the viability of local merchants. If uncompetitive local merchants close shops on Main Street that will put the commercial property tax base at risk as well.

To the extent rural merchants may lag in adapting to the new competitive environment, and given the paucity of other economic alternatives, such competition could not only reduce the local tax base but exacerbate rural out-migration as merchants reduce staff or go out of business entirely. At this early stage, however, such discussion remains only speculative.

In addition to the actual and potential loss of sales and property tax revenue, reduced local business activity will also affect personal and business tax collections by the state. These important state revenues are primarily affected by the level of economic activity. Thus, in those states that are not competitive in capturing a share of the new IT-based economic opportunities (typically, the most rural), there could be a "multiplier" effect for both direct revenue and intergovernmental aids (Esser 1997).[14] To the extent state revenue collections stagnate or fall, intergovernmental revenue sharing and other transfers are likely to follow suit. Such intergovernmental transfers make up a significant portion of local government budgets.

A full discussion of the taxation issues associated with Internet-Based commerce is beyond the scope of this report.[15] However, some of the emerging academic research to date is summarized. The current impact of the prohibition on the collection of taxes on Internet-Based transactions is relatively small, but could become significant in the near-to-medium term (five-plus years) if the most bullish projections of Internet-Based transactions are realized (Goolsbee and Zittrain 1999). Certain sectors, such as retail books, investment brokerage services, and insurance sales, could be more heavily impacted sooner rather than later.

Currently, Internet commerce does not seem to have a significant competitive effect on traditional retail sellers, but this too could change over time and, again, sector-specific differences are likely.

Further, the difficulty and costs of requiring firms to collect state and local taxes are probably not as high as many industry advocates fear (Goolsbee and Zittrain 1999; Alster 1999; National Association of Development Organizations 2000).

Importantly, the moratorium on tax collection does have a regressive effect given the higher propensity of wealthier individuals who use the Internet for purchases, but the effect is decreasing as less affluent people are also purchasing computers and going online. There will likely be a number of people from disadvantaged groups in both urban and rural areas, however, who will never reap the advantage of tax-free Internet purchases.

The Congressional Advisory Commission on Electronic Commerce recently failed to reach consensus on an approach to Internet taxation. The U.S. Congress subsequently approved an extension of the Internet tax moratorium to 2006 (National Association of Development Organizations 2000).

Maintaining Critical Community Services

Among the ubiquitous economic trends that may be observed in rural areas are the consolidation and increasing scale of economic activity. Such consolidation has long been underway in agricultural production systems. Similar trends can be noted in the consolidation of retail sales activity as small, specialized proprietors are replaced by large retail discounters. Even at the scale of communities, retail and service activities continue to consolidate in regional trade centers as many small rural communities stagnate or decline.

It is worth highlighting here in a separate section that other critical rural community services are facing similar pressures. School districts in rural places have long faced consolidation pressures to the considerable consternation of many communities. More recently, health care systems faced a similar restructuring. Many local governments in rural areas heavily subsidize local hospitals, homes for the aged, and other health-related services in a desperate attempt to maintain a quality, albeit inefficient, health care system.

To the extent that emerging communications technologies can partially offset the necessity of scale economies, rural communities may have greater chance of maintaining service systems critical to viability. Such would seem the case in areas of education (distance learning), health care (telemedicine), and business (video conferencing, non-local market access, and business-to-business transactions). Shifting emphasis from local governments subsidizing inefficient service delivery systems to supporting more economically sustainable ones through technology investments might be a positive adaptive strategy.

Considerable barriers remain, however, to fully evaluating the feasibility of such transitions. The first goes back to the capacity of existing telecommunications infrastructure to support high-capacity data transmission. Equally important is overcoming the natural inertia associated with current patterns or the active resistance associated with change. Until such a change occurs, the demand needed to make infrastructure investments feasible will not exist. Compounding the situation is finding the analytic capacity to competently evaluate both the technical and economic requirements of regional service systems. While

local government may not have the capacity to effectively deal with these issues, they certainly must be involved in finding solutions, if for no other reason than to make more effective investments in sustaining critical services.

Local Government Service Provision

Local governments in rural areas are critical local institutions. Almost invariably, public resources are scarce in rural places with stagnant or declining economic and population bases. To the extent these local governments are not utilizing available resources with greatest efficiency and effect, public resources will be unavailable for other investments needed to maintain competitiveness. In many rural places, local government officials fail to appreciate the importance of trends related to IT. Many local officials view investments in computer technologies simply as a "black hole" of expense. While quite a few local governments have cooperated in the development of community Web pages, most see it simply as a public relations and/or economic development tool.

Broader levels of government have been most active in using information technologies as a means to deliver services and reduce costs (OTA 1993; Progress & Freedom Foundation 1998). There are at least three general areas where local governments have the potential to improve service delivery by use of the Internet: accessing local government information, enhancing citizen organization and involvement, and conducting local government business. Local government can improve access to information by making public records available online and keeping information about meetings or public issues current. Similarly, local officials can often respond to public inquiries and complaints faster and more effectively via e-mail than by telephone or in person. They can also use Internet technology to enhance citizen involvement through Internet-Based public polling, referenda, and voting. It is possible to create forums for public issues on local government Web sites.[16]

Among the potentially beneficial uses of the Internet is to conduct the business of government online. There are many types of transactions and filings that can be done using the Internet, ranging from paying a parking ticket to distributing copies of local ordinances. Providing access to records or services online can represent a substantial cost savings for local government workers serving customers at the front desk, and for local business persons, such as Realtors and builders, who spend considerable time at local government offices.

CHALLENGES FOR NATIVE AMERICAN COMMUNITIES

It is appropriate to highlight challenges faced by one subgroup within the larger rural community – Native American communities. Perhaps nowhere is the digital divide greater than with Native American communities, which tend to be among the most remote and poor of all rural places. Yet, the Internet would seem to hold relatively greater benefit for Native artisans and businesses seeking expanded market access as well as providing access to critical services such as education and telemedicine.

The challenges begin with infrastructure access and extend to financing, training, and cultural barriers (Riley, Nassersharif, and Mullen 1999). A survey of 48 Native American tribes revealed that only 39 percent of rural households in the Native communities had telephones, 22 percent had cable television, nine percent had personal computers, and eight percent had Internet access.[17] Twelve percent of the rural households in Native communities surveyed lacked electricity and 23 percent lacked gas service.

Among the barriers to the development of technology infrastructure in Native communities are the generally weak economic base that inhibits investments in infrastructure and worker training, and the geographic remoteness that raises the cost of infrastructure provision. Cultural problems include a general distrust by some Native Americans toward new technologies as well as toward the federal government. Generally, survey respondents viewed federal technology initiatives targeting Native communities as poorly coordinated, poorly communicated and insufficient in light of the severity of the challenges. Finally, respondents said Native communities themselves had failed to sufficiently plan for infrastructure investments.

The solutions to the problems found in Native communities must extend beyond the simple notion of closing the "digital divide." Riley, Nassersharif, and Mullen reported the recommendations emerging from a Native technology infrastructure summit of nationally recognized experts. These included the need for a long-term and consistent federal investment strategy dealing with the overall infrastructure needs of Native communities. A second recommendation was to facilitate public-private partnerships in addressing infrastructure needs and to coordinate the efforts of various providers in areas related to infrastructure, planning, and workforce development. The group also recognized the need to increase the efficiency and effectiveness with which existing investment and service programs are delivered. Finally, there was the recommendation to grant sovereign tribes greater authority to plan, develop, and manage their own technology infrastructure.

ADAPTIVE STRATEGIES
FOR
RURAL COMMUNITIES, LOCAL GOVERNMENTS, AND BUSINESSES

The discussion thus far has identified a variety of issues related to the implications of electronic commerce and, more broadly, information technologies for rural community viability. In this section, we turn to cataloguing some of the adaptive strategies employed to help close the digital divide in rural places.

Strategic Planning for Rural Telecommunications

The process of determining how to bring needed telecommunications infrastructure to a rural community might begin with a local strategic planning initiative (McMahon and Salant 1999; Parker 1996). Strategic planning starts by evaluating the existing market and opportunities and potential future technology applications. Such an initiative involves a broad cross-section of public and private information users and providers.

Beginning with a needs assessment, community leaders inventory existing infrastructure and services as well as current use of available services, estimate potential demand for expanded services, and identify the resources necessary to implement strategies. The second step involves creating priorities, acknowledging that the community is unlikely to obtain all services and improvements at once. The priority might relate to upgrading local school infrastructure, creating a central community access point, or bringing telemedicine services to the hospital, any of which might serve as a starting point for upgrading local infrastructure. The third step is to create an action plan that outlines strategies, funding resources, organizational issues, and a time line for implementation.

The strategies that might be included in the action plan would generally focus on how to bring outside investment into the community or how to marshal the resources found within the community to make needed investments. Attracting outside resources requires demonstrating adequate demand to justify needed investments and/or taking advantage of any of the several assistance programs that may be available. The community might think about ways to aggregate demand to bring it to an economic threshold needed. To marshal internal resources will require building coalitions within the community and a public-private partnership.

While most states recognize the need to strategically plan for science and technology development, few explicitly address the needs of disadvantaged and underserved areas (Clarke 1997). After reviewing 42 state economic development and science and technology strategic plans, the State Science and Technology Institute suggested such planning initiatives are an opportune time to consider the technology needs, including telecommunications, of disadvantaged and distressed communities. Among the “best practices” of states that most closely achieved this goal are that strategic planning initiatives be (a) broadly inclusive of all state interests, including those in distressed areas, (b) involve strong state government leadership, and

(c) establish explicit goals and implementation time lines. Such efforts can ensure that rural communities and other disadvantaged groups are not overlooked.

Demand Aggregation

Low-income and rural communities typically suffer from similar problems when market-driven solutions are needed. That is, they lack the economic base to be attractive investment targets to profit-driven interests. The Benton Foundation (Le Blanc1999a) suggested the principles of cooperatives might be successfully applied to enhance the attractiveness of these communities. The notion is one of aggregating demand into something like a rural cooperative to enhance the negotiating capacity and/or buying power of participating individuals.

An example of such a cooperative is an online buyers club which aggregates demand for various products and services. The incentive for consumers would be lower cost computer hardware or Internet services, while manufactures and service providers gain access to an expanded customer base. Such buyers' clubs tend to work best, however, only where options are limited. Access to multiple providers, rapidly changing technology and falling prices act as disincentives to joint coordinated purchasing, as does the high level of planning and organization required.

Perhaps the most feasible cooperative-type model might function in association with existing trusted local nonprofit organizations. Churches, unions, colleges, tribal councils, agricultural organizations, and other locally based organizations may be in the best position to negotiate with technology manufacturers and providers given strong preexisting ties with larger numbers of potential co-op members. This model could supplement access provided at public locations such as schools and libraries.

A similar strategy is to "piggyback" a number of small users onto communications nodes created for larger users. These *rural area networks* might bring together local businesses, health care providers, and local governments and piggyback them onto a major private sector employer or the state educational system, for example (OTA 1991; Parker 1996).

Yet a third strategy in this group is to offer training and education within the community to show consumers and business owners the potential available (McMahon and Salant 1999). The more local consumers know what is possible using telecommunications technologies, the greater the potential market. Similarly, working with local firms and institutions to create mid-range (five year) information technology improvement plans is another way to create demand, determine future needs, and demonstrate potential demand for outside service providers.

Locally Based Telecommunication Enterprises

In cases where private-sector companies have not provided high-quality, low-cost telecommunications services in rural areas, there have been a number of very successful initiatives to create public or not-for-profit enterprises to fill the gap.

Telecommunication Utilities

Following the model of public electric and water utilities, some rural communities are creating public enterprises to provide advanced telecommunications technologies. The case of Iowa is significant in this respect (Van Wart, Rahm, and Sanders 2000). In recent years, 30 rural communities have voted to create municipal telecommunications utilities. The motivation for action varied, but included dissatisfaction with current service levels, the hope that upgraded telecommunications service would stimulate economic development, the desire to improve educational and other information-intensive local services, and the experience of having prepared for increased competition associated with energy deregulation in the state.

Generally, these initiatives are aided where the municipality already owns an electric utility because revenue surpluses and bond capacity can be directed to the new utility startup. Other keys to success include creating technically sophisticated services; having in-house expertise; securing local commitment by community leaders, businesses, and citizens; having access to financial resources; and effectively marketing the available services. In some cases, cities are providing the backing to help create private local utilities.

While there has been increased interest in creating public telecommunications enterprises, there remain a number of uncertainties. There are significant legal issues to be resolved. Existing private-sector providers in Iowa have challenged the new public competition both in court and in the marketplace. Variable state regulations may not support these types of initiatives in all places. Also, individual communities still need access to the "backbone" infrastructure to connect to the desired broadband capacity. How, where, and by whom that infrastructure has been developed may inhibit efforts to create public enterprises. Finally, the changing nature of the technology itself keeps the situation fluid. Potential advances in satellite and wireless technologies make the future competitive environment uncertain.

Private Not-for-Profit Community Networks

Similar to public utilities, not-for-profit organizations have been formed to bring Internet-related services to underserved rural areas. An excellent example of this type of model is the North Central Kansas Community Network (NCKCN at www.nckcn.com) (Cyr 2000). Started in 1995 by the North Central Regional Planning Commission (NCRPC), the not-for-profit company was formed to bring the Internet to a rural area that did not have affordable access. For an up-front investment of $6,000 in equipment costs and a monthly guarantee of $740 for line and port charges (all paid by the sponsoring local governments and other public participants), the NCRPC leased locally available circuits from area telephone providers. The NCKCN then became the area ISP and created a Wide Area Network (WAN) linking schools, local governments, and libraries. The schools, libraries, and other participants purchased their own equipment (computers, modems, etc.) needed to connect to the ISP and created access points for low- income individuals who would not otherwise have Internet access.

Today, the NCKCN serves a nine-county rural area providing Internet access to homes, businesses, and public institutions at rates vastly more affordable than the Internet service plus long-distance costs previously available. The corporation is profitable based on household and business user charges and even makes annual grants back to the communities. There is currently a waiting list of communities who want to

join the network after seeing the potential of affordable service. These communities are actively lobbying local phone companies for the needed equipment upgrades.

The NCRPC reports numerous peripheral benefits in addition to providing affordable home and business Internet access. The NCKCN serves as a regional link between communities and their respective institutions for purposes of institution-building. Numerous businesses report increased sales with greater market access. They have also been able to document considerable usage of the public access points by low-income individuals, especially for monitoring local jobs-listing bulletin boards.

The greatest hurdle to starting the venture, according to the NCRPC, was convincing local officials to view the initial investment and monthly charge guarantee as if they were public infrastructure investments. Most believed telecommunications services belonged in the realm of the private sector. Yet, for many rural places, alternative organizational models may provide best hope to making the types of telecommunications investments needed in an information-intensive economy.

Upgrading Local Government

The notion of planning is familiar to local governments. Many communities have land use plans intended to facilitate orderly development ten to twenty years into the future. Many engage in capital improvement planning that establishes infrastructure development priorities over the next five years or so. Increasingly, communities are also engaging in *information technology planning* which would anticipate how local government will meet its ever-growing and changing technology needs (Neff and Moulder 1998).

The elements of a local government IT plan would include an evaluation of current and future hardware, software, and staff/training resources. It would also set policies governing IT-related purchases to avoid incompatible or duplicative purchases, and it would develop specific strategies for funding implementation plans. Given the ever-increasing necessity to utilize IT tools, helping local policy makers understand the opportunities associated with local government adoption of technology can help transform IT from a "black hole" of expense to a tool for improved service delivery.

To foster greater awareness and use of IT for local government service delivery, state and national governments and professional service organizations can play a major role in disseminating information about successful applications. Similarly, these applications need to be highlighted in publications and at conferences to help local officials move from viewing such efforts as luxuries of larger wealthy places to seeing the possibilities of local application.

Sustainable Critical Services

Among the larger challenges associated with use of IT to maintaining critical community services is one of facilitating the transition of inefficient existing services to more sustainable forms. As previously discussed, possibilities exist in areas of education and health care as well as business. Achieving such transitions could potentially free scarce local public resources for more productive use. The major challenges, however, will be in creating a local process capable of fostering progressive perspectives about service organization as well as providing competent economic analyses to demonstrate the feasibility of alternatives.

The Cooperative Extension Service may have a great deal to offer in this area. A good model is found at Oklahoma State University where economists and outreach specialists have long experience in working on public service provision issues, helping rural communities organize services for greater efficiency and effectiveness (Doeksen 1997). Specialists there utilize a "tool box" of analytic methods to help community leaders make effective decisions about service provision. To be successful, however, the effort requires more than a technical consultant providing an economic analysis. It also requires a broad-based community process whereby leaders and concerned citizens reach their own conclusions about what the community can sustain. While the focus may be on a discrete service of broad community concern (education, health care), incorporating an IT component would be a useful addition and catalyst. This model is being expanded into a national initiative as the Community Policy Analysis Network (CPAN) under the leadership of the Rural Policy Research Institute at the University of Missouri (Scott and Johnson 1998).

Support from Broader Levels to Foster Technology Development and Literacy

There are numerous initiatives to help close the digital divide experienced by disadvantaged groups. Federal and state governments are often a primary source of funding, technical assistance, and policy making to help put the telecommunications infrastructure in place. The executive branch of the federal government has placed great emphasis on issues associated with Internet technology development and dissemination and, as a result, many federal agencies have moved aggressively to develop assistance programs (U.S. Government Working Group on Electronic Commerce 1999). Beyond what broader levels of government are doing, however, is an impressive array of programs and activities by many nonprofit organizations, private foundations, and private corporations.[18] One of the critical strategies for local communities concerned about access to information technologies is to take full advantage of available assistance from external sources. Here, a sampling of the initiatives of relevance to rural places are identified.

The Federal Communications Commission has created a number of programs to support expanding telecommunications access to underserved communities as a result of the 1996 Telecommunications Act (Federal Communications Commission 1999). Programs have been established to assist disadvantaged and hard-to-serve areas gain access to a range of telecommunications services.

The FCC currently maintains four programs, each designed to address a specific set of universal access needs: The *high cost program* provides support for telephone service providers in high-cost areas of the country. The *E-rate program* provides variable discounts on telecommunications services for schools and libraries, depending on community income levels. The Rural Health Care Division of the Universal Service Administration Corporation (USAC) was formed to ensure public and nonprofit rural health care providers receive telecommunications services necessary for the provision of health care services at rates comparable to those paid for similar services in urban areas. For low income consumers, the *LinkUp* program provides cost reductions in initial telephone connection charges and the *Lifeline* provides reduced monthly service charges.

The federal government also supports the *Community Technology Centers* (CTCs) Program through the U.S. Department of Education (see the Department's Web site at: www.ed.gov/offices/OVAE/CTC/index.html). CTC grants to state and local educational institutions and other public and private agencies provide for the development of free or low-cost public access to technology and training. Targeting urban and rural areas and economically distressed communities, the centers provide access to computers and the Internet, as well as training for adults and children in computer and Internet skills.

The National Telecommunications and Information Administration administers the *Technology Opportunities Program* (TOP). The program provides matching grants to improve access to and the quality of education, health care, public safety, and other community-based services. The program emphasizes innovative uses of network technology.

The Department of Housing and Urban Development is also supporting *Neighborhood Networks* (www.neighborhoodnetworks.org). The program establishes technology centers in or near HUD multifamily housing developments. The programs offer technology access and a variety of training services relating to technology use as well as job readiness support, microenterprise development, GED certification, health and social services, and adult and youth training programs.

Using support from a variety of public and private sources, the National Urban League is working to establish *Technology Education and Access Centers* (TEACs) (www.nul.org/ttp). The program is attempting to create locally based institutions to serve as centers for community development and training.

Several states have begun to use requests for telephone company mergers as an opportunity to negotiate expanded technology access for community telecommunication services. In California and Ohio, state regulatory commissions used the merger review process to facilitate private company grants to create technology access and training programs in rural, low-income and underserved communities (Goslee 1998). Similarly, state regulators control various subsidy mechanisms that help determine whether carriers invest in new technology and what rates are charged for services.

State government itself represents a major telecommunications customer. States that buy dedicated leased lines for private use should consider the rural development implications. In Oregon, for example, the state replaced leased lines used to connect lottery terminals with dedicated data networks conducive to expanding comparable capacity to rural businesses and residential users (Parker 1996). Similarly, Iowa has invested nearly half a billion dollars in a fiber optic system operating in all of the state's 99 counties, but neither local governments nor the private sector are yet legally allowed direct access to the system (Van Wart, Rahm, and Sanders 2000).

Similarly, the extent to which the state itself embraces the use of technology for service delivery can have a powerful effect on rural access. State governments may be able to improve cost effectiveness and service delivery by utilizing public kiosks and on-line access in addition to the traditional service delivery methods. Such efforts will both encourage infrastructure capacity improvements and provide an important role model for communities to emulate.

Local Initiatives to Foster Technology Development and Literacy

There are too many locally-based initiatives to catalogue.[19] More importantly, their collective experience provides guidelines useful for improving the prospects of creating successful local programs. Among the more important elements is that successful programs tend to be *locally*-designed and driven (Le Blanc 1999b). This is to say that each program needs heavy input from local institutions and the target population to create programs responsive to the needs of the under-served. While the federal government and major private foundations have a demonstrated commitment to under-served people, a "standard template" approach is unlikely to have the desired impacts.

One way to increase the desired impact is to work through established, trusted local institutions. This is to incorporate an added element of technology access and training to places and programs where the underserved already go for education, training, or other assistance. Thus, program success is more likely when programs are built through existing community centers, service programs, and other existing local institutions (Kretzman and McKnight 1993; Becht, Taglang, and Wilhelm 1999).

The other major element needed for success is to emphasize training in the use of technology beyond simply providing access. Many among underserved populations need encouragement and assistance in overcoming their ambivalence or reticence toward technology. The success of a technology access center will increase when coupled with targeted training opportunities such as after-school programs for youth, job-skills training for the poor, family communication opportunities and health care information of interest for the elderly, or business applications for remote locations (Becht, Taglang, and Wilhelm 1999).

Finally, while there has been much made of the need to foster technology-related skills, others have prudently suggested the need to foster generic learning skills (Anderson and Bikson 1998). By focusing on generic skills such as learning-to-learn, analysis and problem solving, innovation and communication, individuals can function more effectively in a changing and technology-intensive society. In most cases,

specific technology-related applications can be learned with modest effort, but the life skills fostered with generic learning are applicable across any setting and in all aspects of life, both economic and noneconomic.

An organization in Minnesota developed a checklist of items that community leaders can use to assess their readiness, and identify the steps needed, to compete in an information-intensive economy. Their checklist provides a good summary of many of the issues to be addressed at the community level. *E-Commerce Ready* (Gunyou and Leonard 1998) suggests that a community-based review process include the following:

Creation of partnerships. A broad coalition of public and private institutions can identify community needs and mobilize for effective action. The coalition goes beyond communication providers and local government to include businesses, banks, schools, social and civic groups, health care providers, nonprofit organizations, and others. Various age and socioeconomic class participation can help ensure that the needs of the less-advantaged are also considered.

Training and continuing education/workforce development. People of all ages can benefit not only from electronic commerce, but also from access to the information available using advanced communication technologies. However, many groups, such as the elderly and low income, may lack the technical skills needed to access the technology. Community-based training programs targeting specific groups in the places they are inclined to be are needed to provide exposure and promote learning and skills enhancement.

Continuing self-assessment. The process of needs assessment should to be ongoing. Community assets related to communication technologies and human resources need to be inventoried and updated regularly. Similarly, progress in achieving community goals needs to be regularly assessed.

Technology design integration. Advanced communication technologies should be integrated into the overall goals of the organization, whether it be business, government, education, or health care.

Prioritization of community technology needs. Clearly, a community cannot take care of all its communications needs at once, nor should it jump aboard every new technology bandwagon. It will need to prioritize where and when to emphasize any of the multiple needs.

Understanding and participation in the public policy arena. Many public policies created external to the community affect prospects within the community. Rather than assume such decision making is beyond local control, community members can help inform state and federal policy makers about local needs and preferences for solutions.

Adapting to the changing economy. Thoughtful community leaders need to facilitate an ongoing local discussion about what the changing economy is likely to mean for local prospects. The changing economic milieu presents both opportunities and threats to local viability. As the technology continues to evolve, so do local prospects. There needs to be a continuing reassessment of these threats and opportunities.

Sustainability of efforts. Thought needs to be given to how local initiatives will be sustained over time. Whether the initiative is financing for community infrastructure, upgrading in-house technologies, or continuing training and skills development, thought needs to be given to how the effort will continue after the first round of investment or the first wave of enthusiasm wanes. Examples of efforts in this area might include local government information technology planning similar to traditional capital improvement planning, or the notion of *Master Internet Volunteer* programs where the trainees become the next generation of trainers.

Inclusiveness. To reduce the gap between those with and without access, the notion of inclusiveness needs to permeate local planning and action. Without the conscious effort to be inclusive, some groups will invariably fall behind.

Celebration. Too often, communities forget to celebrate their progress and accomplishments. The benefits of celebration, however, can be substantial. Celebration highlights local role models and successful initiatives. It helps sustain local enthusiasm and involvement. It helps to keep the issue a local community priority.

CONCLUSIONS

This review leads to several conclusions related to rural competitiveness in an era of advancing information technologies and electronic commerce. First is the need to appreciate the full scope of the phenomenon with which we are dealing. If our concern is one of rural economic viability, we must view electronic commerce within a broader framework of what it means to be competitive in an economy increasingly dependent on advanced information technologies. We need to move beyond emphasis on "getting on the Web" to a fuller range of concerns including strengthening human and institutional capacities in addition to access and infrastructure concerns. To remain economically viable, rural communities will require both access and the capacity to utilize technology for a broad range of applications related to learning, institution building, community organization, and services delivery, as well as economic uses.

Similarly, local governments need to move beyond the narrow concern with Internet tax-policy issues to provide the essential leadership needed to address the multiple requirements of preparing their citizens, businesses, and local institutions to compete in an IT-intensive economy. To be sure, broader levels of government can make a significant contribution to ensuring technology access. Individuals and community organizations can also have an important impact. What is needed, however, is a much broader discussion at the local level of the myriad ways in which IT can build individual and institutional capacities within the community. There are few institutions in rural areas better able to lead a broad and inclusive discussion and to provide the organizational leadership required than is local government. To this end, more effort is needed to help local leaders fully appreciate the potential applications and implications of IT access and its effective use.

While virtually any community, rural or urban, can initiate programs to improve access and close the digital divide, it remains unlikely that all places and people will benefit uniformly and to the desired degree from the new technology. For some individuals and places, there simply is not the perceived need. For other places, there may not be the capacity to secure the necessary technology improvements nor the ability to effectively use the technology were it in place. While an overriding policy objective should be universal access and effective use to the greatest extent practical, it is doubtful it will be achieved. There remains hope, however, to the extent trends toward media convergence continue and technology advances in its ability to utilize existing infrastructure, that places and people who might not otherwise be inclined will be encouraged to become users.

State and federal levels of government seem to have several useful roles. These would be in areas of telecommunications regulation and any needed reform, community infrastructure access and improvement, direct applications (serving as role model by demonstrating benefits), gathering information, research and success stories and facilitating the dissemination of such information, and providing financial assistance to enable and bolster local initiatives. The activities of numerous private foundations can be similarly beneficial in many of these areas.

It is at the local level where applications and training would be most effective in bringing technology to people in ways most relevant. It seems the initiatives that utilize local institutions in preexisting trusted

relationships will be most effective in overcoming barriers to use. Finding the technology linkages to existing service needs makes the technology more relevant and useful to a greater number of people.

To some extent, it would seem private markets will also serve to close the digital divide. As the benefits of business-to-business commerce become more ubiquitous, smaller firms in rural places will adapt or be replaced by more competitive firms. As technology advances drive down costs of delivery, the market potential of even small and remote places may be realized and service access will result.

Clearly, the road to universal access and use of information technologies will be uneven. The potential benefits justify high-profile and aggressive measures to ensure such goals be achieved as soon as practical, whether the underserved population exists in a central city, rural community, or Native American reservation. As with many economic trends, however, it takes time for the effect to spread. It is likely there will always be underserved populations as technology continues to advance. The communities that are most likely to prosper are those with strong and visionary leadership and diverse and active local institutions. While there is much that broader levels of government and private foundations can do to ensure the doors are open, the decision to walk through is made at the local level.

ENDNOTES

1. It should be noted that the conceptualization offered by CREC deals with activity in the private sector. Were we to consider public involvement in the development of telecommunications infrastructure and services, we would expect the level of activity to be even more.

2. Technology-producing companies actually reduced the rate of inflation due to rapidly *declining* prices of many computer and related items.

3. There are currently no government statistics available reporting the value of business-to-business electronic commerce, and private estimates vary greatly. Depending on the methods and definitions used, forecasts for 2003 range from $634 billion to $2.7 trillion (Lawrence 2000).

4. A recent example is the joint venture by General Motors, Ford, and DaimlerChrysler to form an integrated supplier exchange through a single global portal. The new exchange is open to all automotive manufacturers and suppliers and features a common set of standards for supply chain transactions. Executives for the companies tout it as a way to drive down the costs of exchange and expect the venture could be doing a trillion dollars worth of business annually (General Motors press release, February 25, 2000 and National Public Radio News, February 28, 2000).

5. The U.S. Census Bureau estimated 1st quarter, 2000, online retail sales at $5.3 billion (U.S. Census Bureau 2000). The Census Bureau estimates did not include sales of services such as travel, entertainment, or brokerage services. Future Census estimates will include a broader range of business-to-consumer transactions. Private estimates ranged from $4 billion to $14 billion, depending on the transactions counted. Forrester Research, a leading Internet commerce research firm, estimated 1st quarter, 2000, sales at about $8.2 billion (Forrester Research, Inc. 2000).

6. The traditional rural advantages referred to are lower labor and land costs. While these are important factor inputs for IT-related businesses just as with any other business, more critical to IT business success will be access to telecommunications infrastructure and labor with the skills that are in high demand by IT businesses, e.g., see Table 4 on page 10.

7. Of course, rural areas have their share of trade, service, and manufacturing businesses that can function well in a rural setting and benefit from Internet access. Lands End in Dodgeville, Wisconsin is a case in point. Similarly, we can expect agriculture and other extractive industries to also benefit and strengthen their competitive position by using information technologies. Our point is to suggest that the overall composition of the rural economy places it in a less favorable position than urban areas. Additional research will be required to confirm or refute this speculation.

8. There are three ways to provide high-speed data capacity to rural areas (Staihr 2000). The first is through digital subscriber lines, the existing copper wire system. The advantages of this technology is that it currently exists throughout rural areas. It still requires, however, expensive equipment upgrades at the telephone company's central office. The second technology is throughcable modems. This

technology is even faster than the digital subscriber lines, but also requires the cable company to upgrade the cable network and is less ubiquitous in rural areas. Finally, there is wireless technology employing satellite or microwave data transmission. This technology is currently least developed and will require substantial investment, development, and regulatory clarification.

9. For extended discussions related to rural telecommunications infrastructure the NTIA/Rural Utilities Service (2000) report is the most recent and comprehensive Also see the OTA (1991) report for a somewhat dated but thorough review. Other extended treatments can be found in Egan (1996), Burgess and Raitano (1999), and Allen et al. (1995).

10. An important issue affecting rural prospects will be how competition is established in local telephone services in response to the 1996 Telecommunications Act (Staihr 2000). Prior to the Telecommunications Act, local phone companies had a monopoly on the connection between the customer and the phone company's computer (the "last mile"). The alternatives for providing access to this connection (and opening competition among providers) are to either lease a portion of the line to a competitor or to resell the existing telephone company's services. While the leasing option is probably preferable from the customer's view, either alternative entails additional challenges in rural areas. Leasing may not be feasible due to the numerous subsidies across various types of telecommunications services, and reselling may not prove profitable given the small customer base in rural areas. Even with new competition theoretically available, rural areas may still see fewer choices than urban areas.

11. It might be noted that some of the difficulties related to the limited local property tax base have been brought on by local governments themselves. To the extent local governments compete for new businesses through the use of local property tax abatements, they restrict their own access to important new wealth, relying instead on the presumed indirect tax base growth associated with accompanying population in-migration and increased local income. These benefits may be generally overstated, given the high public service costs that accompany residential growth. Rural leaders, however, are reluctant to give up an economic development tool in a competitive environment.

12. Many estimates of state and local government sales tax revenue losses tend to overstate the total value of the loss (Garrett 2000). Typically, an estimate is generated by taking the projected total national value of e-commerce transactions, apportioning an appropriate share to a state or locality, and applying an applicable tax rate. This overstates the potential revenue losses for several reasons. First, the total value and largest share of e-commerce includes business-to-business transactions which are tax-exempt. Second, the assumption inherent in the procedure is that there would have been a local alternative to all on-line transactions, which would not be true. Finally, at least a percentage of on-line purchases are for goods, such as food, which are also typically tax exempt. It should also be noted that many online purchases are currently subject to sales taxes because the manufacturer will frequently have a nexus, or physical presence, in the state. This is often the case with computers and computer products, a large on-line sales category, that requires service and repair.

13. This estimate is applied to state sales tax revenues only and does not include revenue for local governments in the 32 states that permit a local sales tax. Revenues in five states that do not collect sales taxes will not be affected. Importantly, Bruce and Fox (2000) also account for a baseline level of decline long underway due to other trends such as changing consumption patterns and legislated exemptions. They estimate that 70.1% of sales tax revenue losses are attributable to business-to-business transactions, such as taxable computing, electronics, and motor vehicles, and 29.9% attributable to business-to-consumer transactions.

14. That rural states cannot be competitive in capturing IT-opportunity is a debatable point. Some rural states, such as Utah and South Dakota, are home to major Internet operators and effectively support jobs and state/local government revenues thanks to customer bases in places like California and New York (Ornstein 1999). These cases, however, are probably more an exception than the rule.

15. There currently exists a substantial literature on the topics of e-commerce taxation and the Internet Tax Freedom Act. A good overview of the issues associated with taxation of electronic commerce is found in the Department of Treasury's 1996 "Selected Tax Policy Implications of Global Electronic Commerce." Fox and Murray (1997) also provide a good overview of the tax implications of electronic commerce. Other useful analyses can be found in Soete and ter Weel (1998) and the Electronic Commerce Advisory Council, State of California (1998). A good source of information related to the activities of the Internet Tax Commission can be found at the Advisory Commission on Electronic Commerce' Web site (www.ecommercecommission.org/) and U.S. House Representative Cox's Internet Web site (cox.house.gov). From an advocacy perspective, The National Association of Counties (www.naco.org) and the National Association of Development Organizations (www.nado.org) have a number of briefs on the topic, as well as information from Vertex Inc. (www.vertex.com/taxcybary20/) and the Convergence Tax Forum (www.nhdd.com/taxforum/Convergence_home.htm).

16. This can have an indirect benefit of strengthening local institutions by opening new channels of communication within the community (Le Blanc 1999b). Virtual "communities of interest" can form, stay active, and dissolve as issues warrant. People who otherwise can not find the time for involvement can be encouraged and empowered. If the objective is one of stimulating greater levels of communication and involvement in community issues, such forums provide new opportunities. The public forum of a local government Web site may be a place to host such activity or to help bring people together to form private coalitions.

17. A more comprehensive study of telephone penetration rates by the NTIA (1999) showed a somewhat better picture of Native American telephone access. In their review, 34 percent of rural Native American households and 38 percent of low-income Native American households did not have a telephone. They also reported 19 percent of Native Americans have access to the Internet and that schools and libraries on tribal lands have among the highest rates of Internet connectivity among all ethnic groups, thanks to federal and private efforts. Still, Native Americans were consistently among the lowest of all ethnic and socioeconomic groups in measures of telecommunications access and almost any other measure of social and economic well-being.

18. Information and links to a large number of public and private initiatives can be found at www.Digitaldividenetwork.org/index.adp. Information related to additional sources of financial support for service and infrastructure can be found in National Telecommunications and Information Administration and Rural Utilities Service (2000) available at www.ecommerce.gov.

19. While we can not hope to enumerate the many success stories of communities and local businesses who have exploited information technologies and the Internet, there are many, even in remote and distressed rural places. Several sources that catalogue such success stories are Georgia Institute of Technology (1999); the Benton Foundation Web site (www.benton.org); Goslee (1998); and the Digital Divide Network Web site (www.digitaldividenetwork.org).

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